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NOTE

TURION PRODUCTION BY *RUPPIA MARITIMA* IN CHESAPEAKE BAY

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Turions are mechanisms for overwintering and may function as hibernacula that form during autumn when the meristematic tips of rhizomes form a bulb-like structure composed of leaf tissue (Sculthorpe 1967). During spring, new leaves grow from the turions, and the entire structure can break off the parent rhizome and disperse to new habitats. Turions have been described for *Hydrocharis*, *Myriophyllum*, *Potamogeton*, and *Utricularia*. Brock (1982) described turions for the two Southern Hemisphere species, *Ruppia tuberosa* J. S. Davis & Tomlinson and *R. polycarpa* R. Mason. In these species, the turions acted as perennating agents. Turions have not been described previously for *R. maritima* L.

DESCRIPTION

Turions of *Ruppia maritima* were discovered in June 1992 at several locations along two transects across a *R. maritima* bed in lower Chesapeake Bay near the mouth of the Rappahannock River (76°20′N, 37°37′W). *Ruppia maritima* was asexually increasing in this area (Orth et al. 1989). The transects were part of a seed reserve study. The turions appeared while digging sediment cores along the Rappahannock River transect. Water temperature was 19°C, and the turions were not incorporated in the sediment core itself, but drifted to the surface when the substrate was disturbed. Drifting turions occurred at four locations along the transect, totaling 10 turions. No turions were found at any other of five transects during the course of this study. Dissection and microscopic inspection showed that the turions possessed leafy aer-

enchyma, similar to the Type II turions described by Brock (1982). Type II turions contain meristematic tissue enclosed by swollen leaf structures with numerous enlarged starch-filled cells. The dissected tissue contained cells that stained positive for starch with potassium iodide (IKI). All turions were 1–2 cm in diameter and had new leaves developing.

VOUCHER SPECIMEN: Virginia: Lancaster Co., near Weems, 8 Jun 1992, *Rosenzweig s.n.* (VPI).

DISCUSSION

Verhoeven (1979) described the growth habit of *Ruppia maritima* to include horizontal rhizomes and vertical stems. He described vegetative dispersal by fragmented vertical stems that occurred during the growing season. Plants overwintered as rhizomes, and rhizomes or seeds reestablished populations. Silberhorn et al. (1996) noted that in Chesapeake Bay, *R. maritima* shoot and seed production were both very high. We found that *R. maritima* persisted in some areas and in others it was ephemeral. Our studies suggest that factors influencing growth, distribution, and abundance of *R. maritima* include water quality, habitat quality, inter-specific competition for resources (primarily with *Zostera marina* L.), and the success of different life-stages of plants. First-year plants may not become reproductive at some sites (unpubl. data), so that a newly colonized site may be partially or completely devoid of plants the following growing season, depending on water quality or habitat quality stresses in the new stand. Perennial persistence of *R. maritima* depends on a combination of environmental, ecological, and specific biological factors of the plant.

Asexual propagation is an important means of colonization for aquatic plants, and spreading by rhizomes, fragments of rhizomes, stolons, and tubers may contribute to large clonal populations of aquatic species (Sculthorpe 1967). In Chesapeake Bay, turions may provide an additional means of asexual reproduction that contributes the ability to rapidly colonize suitable habitats. Turions, with their high starch content, should be capable of new plant growth at the beginning of the growing season. More research is needed to determine if turions are more wide spread in this species in Chesapeake Bay and elsewhere. Turion production

is seasonal (Sculthorpe 1967), so year-round sampling should be done to detect when turions are produced in Chesapeake Bay. If turions are being produced only at certain sites or at certain times, then it will be important to identify what factors influence turion production in this species.

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